ABSTRACT

A communications device includes a symbol encoder for receiving data comprising a symbol and for receiving a first signal having a positive entropy. The symbol encoder adds to the first signal a plurality of delayed versions of the first signal. Each delayed version of the plurality of delayed versions has a plurality of available values. The symbol is represented by a set of delay values, a delay value of the set of delay values including an available value of the plurality of available values for the each delayed version of the plurality of delayed versions. The communications device also includes a transmitter for receiving the encoded data from the symbol encoder and for transmitting the encoded data. For example, the first signal having positive entropy includes a chaotic signal, noise signal, or a positive entropy, baseband signal modulated onto a positive entropy signal having a higher frequency than the baseband signal. For example, the chaotic signal includes a Lorenz system-generated chaotic signal or a Rossler system-generated chaotic signal. The communications device supports bandwidth-efficient transmission in communications media.